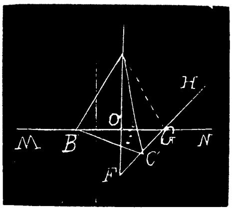
or, $\dfrac{h(\sin C\sin E-\cos C\sin E)}{y(\sin A\cos E+\cos A\sin E)}=\dfrac{\sin C}{\sin A}$; or $h(1-\cot C\tan E)=y(1+\cot A\tan E)$, or

$$h-y=(h\cot C+y\cot A)\tan E\text{; but }\tan E=(h-y)/x,$$

$\therefore$ $x=y\cot A+h\cot C$, or $y=x\tan A-h\cot C\tan A$, as the locus of C.



For $C=A$, we have $y=x\tan A-h$.

Make $OF=OA$, draw FH so as to make $\angle HGN=\angle A$, draw AG. $\angle HGN=OGF=\angle AGO=\angle A$.

Since $\angle BAC=\angle BGC$, $ABCG$ is concyclic.

$\therefore$ $\angle ACB=\angle AGB=\angle A$, $\therefore$ $\angle C=\angle A$, which unifies geometrically for the case in which the angles at A and C remain equal.

92. Proprosed by **JOSIAH H. DRUMMOND, LL. D., Counselor at Law, Portland, Me.**

Let $ABCD$ be a quadrilateral inscribed in a circle. Draw the diagonals AC and BD. Show that $AB.BC : DC.AD=BD : AC$. [From a note in *Young's Geometry*, edition of 1830.]

Solution by the PROPOSER, and J. SCHEFFER, Hagerstown, Md.

Let F be the intersection of the diagonals.

Then $AB : BF :: CD : CF$,

or $AB : CD :: BF : CF$,

and $BC : AD :: CF : DF$.

Hence $AB.BC : AD.CD :: BF : DF$,

(I) and $AB.BC+AD.CD : AD.CD : BF+DF(=BD) : DF$.

In like manner it is shown

(II) that $AB.AD+BC.CD : BC.DC :: AC : CF$.

But $AD : DF :: BC : CF$,

or $AD.CD : DF :: BC.CD : CF$.

Combining these with (I) and (II), we have

$$AB.BC+AD.CD : AB.AD+BC.CD :: BD : AC. \qquad \text{Q. E. D.}$$

Also solved by *B. F. SINE, CHAS. C. CROSS, WALTER H. DRANE*, and *G. B. M. ZERR*.

93. Proposed by **G. B. M. ZERR, A. M., Ph. D., President and Professor of Mathematics, The Russell College, Lebanon, Va.**

While surveying in a level field I notice a mountain behind a hill. Wishing to know the height of each I take the angles of elevation of the tops of both and find them to $\beta=45°$, $\delta=40°$. I then measure a straight line $a=400$ feet, and find the angles of elevation of the tops to be $\gamma=42°$, $\mu=38°$. After measuring $b=300$ feet more in the same straight line I find the elevations to be $\lambda=40°$, $\nu=36°$. Find the height of each.

Solution by the PROPOSER.

Let $AB=400$ feet$=a$, $BC=300$ feet$=b$, $OP=x$, $QR=y$.